

First record of the subfamily Pycnocheiridiinae from South America, with the description of *Leptocheiridium pfeiferae* gen. n., sp. n. (Arachnida:Pseudoscorpiones: Cheiridiidae)

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First record of the subfamily Pycnocheiridiinae from South America, with the description of *Leptocheiridium pfeiferae* gen. n., sp. n. (Arachnida: Pseudoscorpiones: Cheiridiidae). - The cheiridiid subfamily Pycnocheiridiinae is recorded for the first time from South America, *Leptocheiridium* gen. n. and its type species *pfeiferae* sp. n. are described and illustrated. The new genus shares with *Pycnocheiridium* Beier, 1964 (type genus of the Pycnocheiridiinae Beier, 1964) the same morphology of walking legs, eight trichobothria on the fixed chelal finger, only two on the movable finger, and the presence of strongly clavate vestitural setae. *Leptocheiridium* gen. n. is well characterized by the shape of its slender pedipalps, the presence of three sub-equal setae in the rallum, the presence of five setae on the cheliceral hand, the morphology of the female galea, and the presence of a well-developed transverse furrow on the carapace.

Keywords: Taxonomy - ecology - neotropical region - Ecuador - bark dweller.

INTRODUCTION

Beier (1964) erected, within the family Cheiridiidae, the subfamily Pycnocheiridiinae Beier, 1964 for the monotypical genus *Pycnocheiridium* Beier, 1964 (with its type species *mirum* Beier, 1964). This genus takes an intermediate position between Cheiridiidae Hansen, 1893 and Pseudochiridiidae Chamberlin, 1923 in having clearly separated femur and patella on walking legs I/II, femur+patella of legs III and IV with a distinct, nearly vertical suture (Judson, 1992), eight trichobothria on fixed chelal finger, and 5 setae on the cheliceral hand (pseudochiridiid characters), whilst having normal, unmodified coxae IV also in females, normal-shaped tergites (not chevron-shaped), a rallum with three setae, of which the anterior one is larger and dentate (Judson, 1992), and only two trichobothria on the movable chelal finger (cheiridiid characters). Only a few specimens of *Pycnocheiridium mirum* are recorded from South Africa (Eastern Cape, Kwazulu-Natal). Nothing is known on its biology (one female was "sifted, (from) very humid rain forest, very thick humus"), and it "appears to be one of the rarest South African species (of pseudoscorpions)" (Judson, 1992).

Harvey (1992) placed Cheiridiidae (without mentioning the subfamily Pycnocheiridiinae), together with four other families, in the superfamily Garypoidea. Murienne *et al.* (2008) re-established the superfamily Cheiridioidea, including Cheiridiidae, Pseudochiridiidae and Sternophoridae, by using molecular sequence data. However, their analysis is based on a very low number of genera and species (three) studied. The phylogeny of Cheiridioidea and its validity as a superfamily has also been discussed by Judson (2000).

In the course of the worldwide research project (MACAG - Monitoring of Arthropods along Climate and Altitude Gradients: see Schmidl, 2009) conducted by the junior author (JS), 339 samples from tree bark were collected in 2007, 2008 and 2009 at 1000 m (warm rainforest), 2000 m (cloud forest) and 3000 m (Paramo transition forest) in the Podocarpus National Park in Ecuador, to analyze species compositions of arthropods in regard to patterns of diversity between trees, plots and altitudinal levels, and for the evaluation of the monitoring performance (application) of the corticolous arthropod fauna. Samples were taken using the barkspray method (protocol according to Schmidl, 2007). A defined area of a living, unbroken tree trunk bark is sprayed with a pyrethroid insecticide spray. Pyrethroids are contact poisons which are highly specific to arthropods and block voltage-sensitive sodium channels in the nerve membrane. Within a few minutes the arthropods lose the ability of coordinated movements and tumble down from the substratum. Pyrethroids show an immediate effect on all arthropods, but are relatively harmless for higher vertebrates. Before spraying, a plastic sheet is tightly pinned to the bottom of the sampled trunk to collect all affected arthropods, which after 15 minutes are brushed into a small, tree-wise labelled plastic bag (Whirl Paks) containing 70% ethanol.

Among the 287 pseudoscorpion specimens, representing seven families and 15 morphospecies, collected during this field survey, we found three specimens of a genus that we place with hesitation in the cheiridiid subfamily Pycnocheiridiinae. A new genus and species are described and figured below. It is well differentiated from *Pycnocheiridium*, the only other known genus in this subfamily.

DESCRIPTION

Leptocheiridium gen. n.

DIAGNOSIS: Member of Cheiridiidae, subfamily Pycnocheiridiinae. Tegument normally sclerotized, vestitural setae of carapace, tergites and pedipalps strongly broadened, leaf-like. Carapace subtriangular, with one pair of eyes, two distinct transverse furrows, the subbasal one flattened, metazone narrow. Most tergites divided, with unmodified lateral borders. Manducatory process rounded, with two marginal setae. Sternites IV to X divided, XI undivided; anal cone with 2 dorsal and 2 acute ventral setae and located between tergite XI and sternite XI; male genitalia of typical cheiridiid morphology (lateral sacs long, well developed, atrium of ejaculatory canal well developed, median genital sac short), female genitalia consisting of three major cribrate plates, the lateral ones more sclerotized than the larger median one. Pleural membrane striate, partly covered with granula. Chelicera with 5 setae on hand; galea short, distinct apical rami present only in female, subgaleal seta near galea base, rallum

with three setae, the distal one with a few fine denticles on anterior margin. Pedipalps coarsely granular, hand nearly parallel-sided; teeth on both fingers mostly acute and contiguous; fixed finger with 8 trichobothria (all situated in basal half of finger), movable finger with 2 trichobothria (*b* and *t*); long venom duct present in both fingers. Coxae IV much wider than coxae I. Leg I: femur distinctly longer than patella and with articulation, tarsal segments fused, without visible suture. Leg IV: femur much shorter than patella, suture nearly vertical, tarsal segments fused, without visible suture, no tactile tarsal seta; undivided arolia shorter than smooth claws.

TYPE SPECIES: *Leptocheiridium pfeiferae* sp. n.

ETYMOLOGY: The genus name is a combination of *Cheiridium* with the Greek adjective “leptos” (thin, slender), referring to the slender pedipalps.

AFFINITIES: *Leptocheiridium* gen. n. is distinguished from *Pycnocheiridium* by its slender pedipalps, the distinct transverse furrows on its carapace, the presence of 5 setae on its cheliceral hand, the female galea with 6 apical/subapical rami, and the three sub-equal setae of its rallum (in *Pycnocheiridium* the anterior seta is distinctly larger: Judson, 1992).

REMARKS: As currently defined, the subfamily Cheiridiinae of the Cheiridiidae, is characterized by having a reduced number of trichobothria on fixed (at most 7) and movable (at most 2) chelal fingers, by the fused femur and patella of leg I and the at least partly fused femur+patella of leg IV; coxa of leg IV also in females unmodified, not enlarged; carapace with two distinct transverse furrows, with depressed metazone (except in *Apocheiridium*), and two eyes; cheliceral hand with 4 setae; first seta of rallum enlarged.

The subfamily Pycnocheiridiinae differs from the Cheiridiinae by having femur and patella of leg I well separated and articulated, femur+patella of leg IV with distinct, nearly vertical suture, and eight trichobothria on the fixed chelal finger. Considering these differences, the Pycnocheiridiinae may even deserve familiar rank.

The new genus *Leptocheiridium* gen. n. confirms the main subfamiliar characters, but differs by the following: number of setae on cheliceral hand (4 vs 5) and morphology of rallum (3 setae, the first one not enlarged), which are probably of generic, but not of subfamiliar importance.

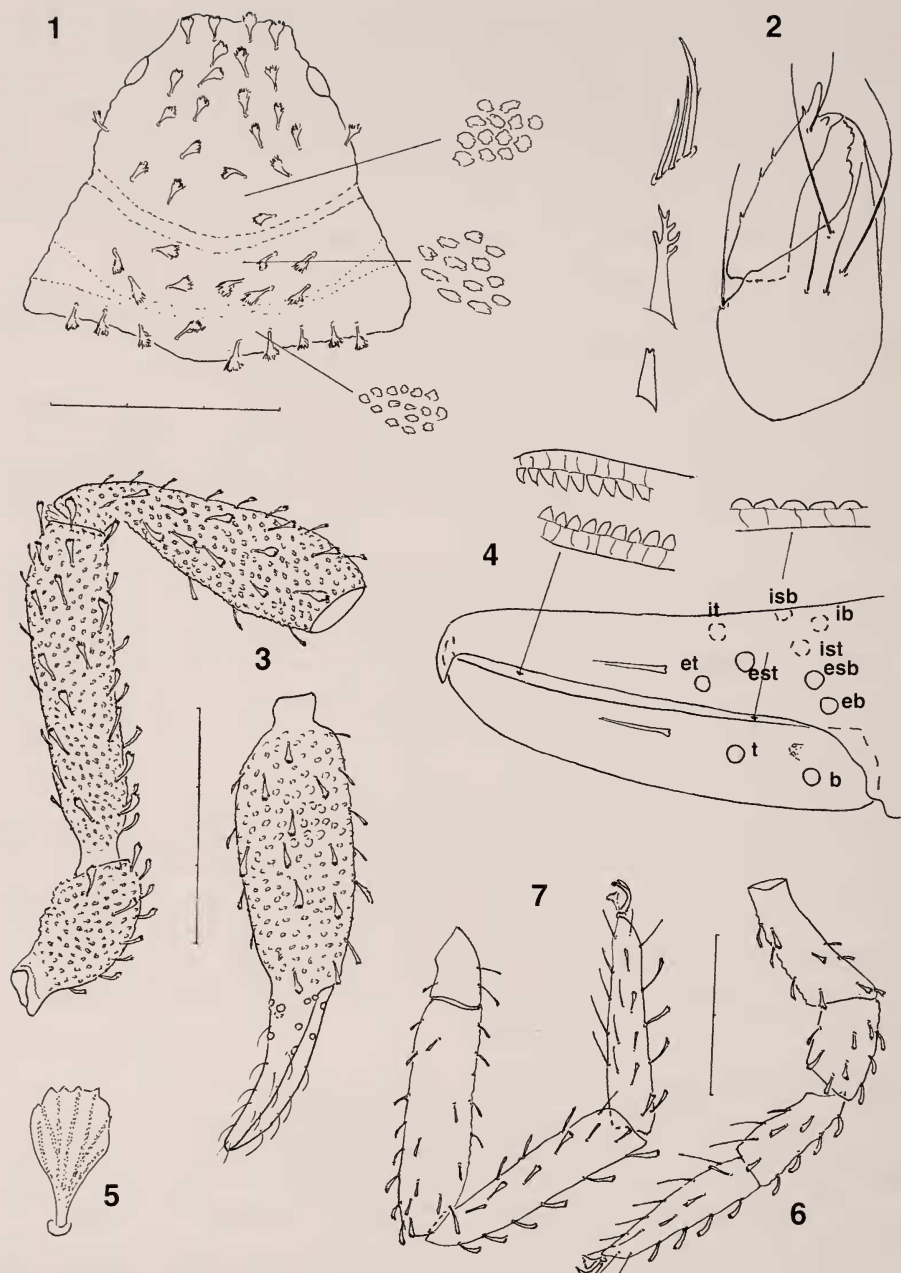
Leptocheiridium pfeiferae sp. n.

Figs 1-10

HOLOTYPE: MHNG, without registration number; ♂; Ecuador, Prov. Zamora, env. Estación Científica San Francisco (ECSF), 2000m asl, cloud forest, on tree bark by bark spraying; 31.VIII.2009, lg. T. Pfeifer (tree # EL6B05).

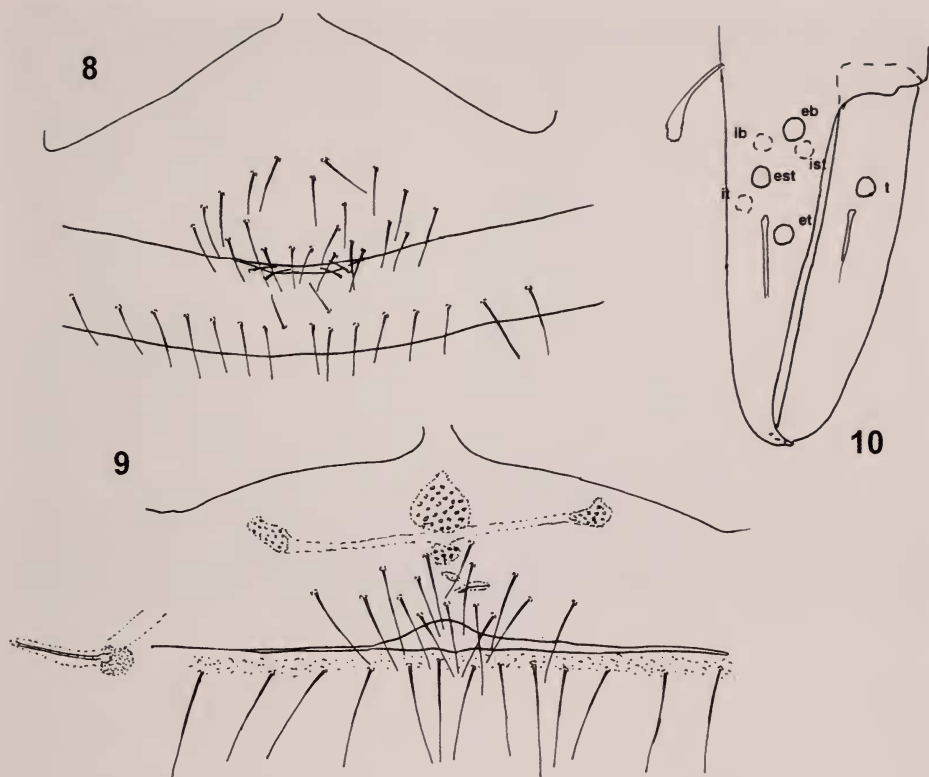
PARATYPES: MHNG, without registration number; 1 ♀ 1 deutonymph; same locality and method, 29.VIII.2009; lg. T. Pfeifer (tree # EQ5B07).

REMARK: The three specimens were collected on two different trees several hundred metres apart. Tree EL6B05 had a dimension at breast height (dbh = diameter at 130 cm height) of 26 cm, a medium coverage of climbing plants, a dense cover of epiphytes (mosses, lichens, algae), and a medium rough bark. Tree EQ5B07 had a dbh of 23 cm, differing from the previous tree by a very smooth bark. Both trees had an intact, unbroken bark.



FIGS 1-7

Leptocheiridium pfeiferae gen. n., sp. n., holotype. (1) Carapace, with granules enlarged. (2) Left chelicera ♂, with rallum and galea of ♂ and ♀ (paratype) enlarged. (3) Left pedipalp. (4) Trichothrial pattern. (5) Tergal seta, enlarged. (6) Left leg I. (7) Right leg IV. Scale unit 0.1 mm.



FIGS 8-10

Leptocheiridium pfeifferae gen. n., sp. n. (8) Sternites II/III of male. (9) Sternites II/III of female, with cribrate plates. (10) Trichobothrial pattern of deutonymph.

DESCRIPTION OF ADULTS: Pedipalps, and carapace brown, tergites yellowish brown, legs including coxae reddish brown. Carapace (Fig. 1) subtriangular, broader than long (length/breadth = 0.9), with two transverse furrows, median furrow broad and laterally distad directed, granular, the subbasal one distinct only laterally; two distinct eyes with flat lenses; anterior margin straight, without epistome; coarsely granular; with 42-46 strongly clavate, leaf-like setae (4 along anterior, 7-9 along posterior margin). All tergites visible dorsally, I-X divided, coarsely granular, setae leaf-like (Fig. 5), chaetotaxy of half-tergites: 5-6/6/6/5-6/6/5-6/5-6/4-5/5/3-4, on IV-X one seta anterolaterally placed, tergite XI with 6 setae (no tactile setae). Manducatory process scaly, with 2 marginal setae; pedipalpal coxa coarsely granular, with 8-9 clavate setae, 0-2 smooth setae and one distal tactile seta, coxa I with 6-8 setae (2 slightly clavate), II with 8-13 smooth setae, III with 15-20, IV with 32-35 smooth setae; genital operculum of ♂ with 28 long setae (Fig. 8), 2/2 short entrance setae, genital organs similar to that of other cheiridiid species (e. g. Dumitresco & Orghidan, 1981; Judson, 1992); genital operculum of ♀ (Fig. 9) with 15 marginal and discal setae, medial cribrate plate apparently divided into one big and one small part, lateral cribrate plates small (Fig. 9);

sternites IV-X divided, the anterior ones scaly, the posterior ones ctenoid-scaly sculptured, some lyrifissures present in front of and between setae, XI undivided, ctenoid-scaly; setae on anterior sternites smooth, acute, on posterior ones slightly clavate (except lateral setae and those of XI), chaetotaxy of half-sternites: 6-8, 0 supra-stigmal setae/7-9+1 suprastigmal seta/8-9/7-8/6-7/5-7/5-6/4, lateral seta on V-X short. Anal cone situated between tergite and sternite XI, with 2 smooth dorsal and 2 (3 in holotype) ventral setae. Pleural membrane shortly granular-striate.

Chelicera (Fig. 2) with 5 long acute setae, *b* distinctly shorter than *sb*, *es* as long as *sb*; fixed finger with 3 retrorse teeth and 2-3 subapical granula, lamina exterior thin; movable finger of ♂ with a few thin, thorn-like projections on lateral side, one also at base of galea, with a tooth-like subapical lobe, subgaleal seta reaching clearly beyond tip of galea in ♂, reaching almost to tip of galea in ♀, galea of ♂ short (Fig. 2) and rounded, with 2 tiny rounded apical tubercles, galea of ♀ long, with 6 short subapical/apical rami; serrula exterior with 12 lamellae; rallum (Fig. 2) with 3 setae, anterior margin of distal one with 2-3 denticles.

Pedipalp (Fig. 3) coarsely granular, vestitural setae leaf-like, chelal finger with fine curved setae; trochanter with small dorsal hump, 2.0-2.1 times longer than broad; femur distally slightly broadened, with a distinct pedicel, 4.3 times longer than broad; patella 3.3 times longer than broad; hand parallel-sided, with pedicel 2.7 times (♂) or 2.3 times (♀) longer than broad and 1.6 times (♂) or 1.5 times (♀) longer than finger; chela with pedicel 4.4 times (♂) or 3.9 times (♀), without pedicel 4.2 times (♂) or 3.6 times (♀) longer than broad; teeth of chelal fingers acute, slightly retrorse (in distal third), then becoming flattened and rounded in basal part, fixed finger with 33 (♂) or 29 (♀) teeth, movable finger with 27 (♂) or 21 (♀) teeth; long venom duct present in both fingers, nodus ramosus situated in middle of finger; 10 trichobothria (Fig. 4), all 8 on fixed finger situated in basal half, 2 on movable finger situated in basal third (*b* and *t*, following Harvey, 1990); sensillum distal to *b*.

Leg I (Fig. 6): femur and patella articulated, femur 1.6 times (♂) or 1.4 times (♀) longer than patella, femur 2.4-2.5 times longer than deep, patella 1.6 times, tibia 2.3-2.6 times, tarsus 4.3-4.4 times longer than deep, tarsus 1.4-1.5 times longer than tibia; leg IV (Fig. 7): femur much shorter than patella, distinct suture nearly vertical, femur+patella 4.4-4.6 times longer than deep, tibia 4.9 (♂) or 4.5 (♀) times, tarsus 5.2 (♂) or 5.6 (♀) times longer than deep, no tactile setae present; undivided arolia shorter than smooth claws.

MEASUREMENTS (in mm) ♂ (♀): Total length 1.4; carapace length/breadth 0.43/0.49 (0.44/0.51); pedipalp length/breadth: trochanter 0.23/0.11 (0.24/0.12), femur 0.44/0.10 (0.47/0.11), patella 0.40/0.12 (0.44/0.13), hand with pedicel 0.36/0.13 (0.37/0.12), length of pedicel 0.03, finger length 0.22 (0.24), chela length with pedicel 0.58 (0.62); leg I length/depth: femur 0.19/0.08 (0.19/0.08), patella 0.12/0.08 (0.14/0.08), tibia 0.16/0.05 (0.16/0.07), tarsus 0.22/0.05 (0.23/0.05); leg IV length/depth: femur+patella 0.40/0.09 (0.39/0.09), tibia 0.31/0.06 (0.32/0.07), tarsus 0.28/0.05 (0.31/0.06).

DESCRIPTION OF DEUTONYMPH: Carapace 0.80 times broader than long, coarsely granular, medial transverse furrow distinct, only lateral depressions of subbasal



FIGS 11-12

Photographs of tree EL6B05 (locality of holotype) (11) and of tree EQ5B07 (locality of paratypes) (12).

furrow distinct, metazone unsclerotized; 2 flattened eyes; 25 leaf-like setae, 4 along anterior and 6 along posterior margin; tergites divided, smooth, half-tergites with 3 leaf-like marginal setae, tergite XI with 4 setae; manducatory process with 2 setae, pedipalpal coxa with 5 leaf-like setae, coxa I/II with 3, III with 5, IV with 7 smooth acute setae, half-sternites mostly with 3 acute setae, sternite XI with 4 setae. Chelicera with 5 setae on hand, galea with 4 apical/subapical rami, serrula exterior with 10(?) lamellae. Pedipalp: femur 3.5 times longer than broad (0.26 mm/0.07 mm); patella 2.9 times longer than broad (0.24/0.08); hand with pedicel 2.2 times (0.23/0.11) longer than broad and 1.36 times longer than hand with pedicel, finger length 0.17 mm; chela with pedicel 3.8 times, without pedicel 3.6 times longer than broad; fixed finger with 23, movable finger with 21 teeth. Six trichobothria on fixed finger (3 anti- and 3 paraxial ones), movable finger with one trichobothrium (Fig. 10).

ETYMOLOGY: This species is dedicated to Miss Tina Pfeifer (Fürth) for collecting and processing the pseudoscorpions in the 2009 sampling campaign. She invested much time for taxonomic pre-sorting and photographic documentation of this collection in the course of her “Zulassungsarbeit” at the University of Erlangen-Nuremberg.

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